

REMARKS

Claims 1-25 are pending in the present Application. Claims 2, 17, and 22 have been canceled, Claims 1, 3-9, 13, 14, 16, and 21 have been amended, and no claims have been added, leaving Claims 1, 2-16, 18-21, and 23-25 for consideration upon entry of the present Amendment.

Claim 1, 16, and 21 have been amended to recite the limitation "wherein the composition is cold worked." Support for these amendment can at least be found in the claims as originally filed as well as in Paragraph [0041] as originally filed.

Claims 3-9 have been amended to change the dependency to Claim 1.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Over JP 56000241A or U.S. Patent No. 4,253,873 to Sagoi et al.

Claims 1 and 15 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by JP 56000241A ("JP '241") or U.S. Patent No. 4,253,873 to Sagoi et al. ("Sagoi"). Applicants respectfully traverse this rejection.

As currently amended, present Claim 1 claims a composition comprising about 8 to about 9.75 wt% molybdenum, about 2.8 to about 6 wt% aluminum, up to about 2 wt% vanadium, up to about 4 wt% niobium, with the balance being titanium, wherein the composition is cold worked. Applicants have discovered that cold working the titanium alloy provides improved elastic properties. The cited prior art fails to teach or suggest cold working.

In making the rejection, the Examiner has stated that "JP '241 teaches an alloy with excellent impact resistance [and] tensile strength." (Office Action dated March 6, 2006 at page 2) Both JP '241 and Sagoi teach a titanium-based alloy of a high mechanical strength, which provides an excellent material particularly for turbine blades, comprising 2.0 to 5.0% by weight of aluminum, 1.0 to 9.0% by weight of molybdenum, 6.1 to 9.0% by weight of chromium, traces of impurities, and titanium constituting the balance. (see Abstract) To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Variant Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987). JP '241 and Sagoi fail to teach or suggest cold working the

composition as required by claim 1 as presently amended. As will be discussed, a cold worked composition displays properties that a non-cold worked composition does not display. Cold working thus imparts novelty to the cold worked composition over the compositions of JP '241 and Sagoi, neither of which are cold worked.

For example, Table 1 shows the compositions for 9 samples. Sample #'s 1 – 5 represent the claimed compositions while Sample #'s 6 – 8 represent comparative compositions. The alloys in Table 1 exhibit linear superelasticity after being cold worked to a 30% reduction in cross-sectional area. (see paragraph [0052])

Table 2 shows two compositions Sample #10 and 11. Sample # 11 contains 9.59 wt% molybdenum, 3.98 wt% niobium, 1.99 wt% vanadium and 3.13 wt% aluminum and represents the claimed composition. Figures 7 and 8 both reflect the change in properties when a 1 mm diameter wire having the composition of Sample #11 is subjected to cold working. Figure 7 shows that upon being subjected to cold working by reducing the cross-sectional area there is an increase in the ultimate tensile strength (tensile strength at break) of about 10%. Figure 8, however, shows that the elastic modulus is decreased by about 20%. This combination of reduction in elastic modulus and increase in the ultimate tensile strength reflect the formation of linear superelasticity in the claimed composition. These properties are not displayed by conventional metals having similar compositions. (see paragraph [0055], page 13, lines 4 – 7) Hence, samples having the claimed composition display properties upon cold working that are not displayed by the samples disclosed in JP '241 and Sagoi.

For this reason at least, JP '241 and Sagoi do not teach or suggest all elements of the claimed invention and cannot anticipate the claimed invention. Applicants respectfully request a withdrawal of the § 102 (b) rejection and an allowance of the claims.

The Examiner has further stated that Claims 2 – 14 stand rejected under 35 U.S.C. § 102 (b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over JP '241 or Sagoi. Applicants respectfully traverse this rejection.

The Examiner has stated that Sagoi “does not teach the instant cold working step.” (Office Action dated March 6, 2006 at page 2) The Examiner has further stated that it is the Applicants’ burden to show that the process step results in a materially different product from

that disclosed in the prior art. Concerning Claims 3-11, 13, and 14, the Examiner has stated that “because JP ‘241 and Sagoi teach a substantially overlapping alloy composition, then substantially the same properties, such as elastic recovery are expected to be present.” (Office Action dated March 6, 2006 at page 2)

As the Examiner has stated, both JP ‘241 and Sagoi are directed to a high mechanical strength titanium alloy material, which has high impact resistance and tensile strength, for use particularly in turbine blades. (JP ‘241, Abstract; Sagoi, Col. 1, lines 28 - 32) In contrast, as noted above, the presently claimed cold working step results in shape memory titanium alloys having improved elastic properties.

Sagoi in Table 1 shows samples having a tensile strength of up to 110 kg/mm². Figure 7 shows an increase in tensile strength with an increase in the amount of cold work. From Figure 7 it may be seen that the tensile strength of the cold worked composition increases from 1055 MPa (107 kg/mm²) to 1172 MPa (120 kg/mm²). Cold working the claimed composition increases its tensile strength in an amount of about 10% greater than that of Sagoi or JP ‘241. Thus cold working the composition produces samples that have a lower elastic modulus and higher tensile strength than those described in either Sagoi or JP ‘241.

Clearly, the claimed shape memory titanium alloy having superelastic properties (upon cold working) is a materially different alloy from the high mechanical strength titanium alloy of Sagoi or JP ‘241. Applicants respectfully submit that the composition of presently amended Claim 1 is produced by a different process that results in a nonobvious difference between the claimed composition and the prior art alloy. Accordingly, the teachings of JP ‘241 and Sagoi do not render the present claims obvious.

Even if a *prima facie* case of obviousness were conceded, which it is not, it is respectfully submitted that Applicants’ invention is not obvious because the particular combination of claimed elements results in unexpectedly beneficial properties. An applicant can rebut a *prima facie* case of obviousness by presenting comparative test data showing that the claimed invention possesses unexpectedly improved properties or properties that the prior art does not have. *In re Dillon*, 919 F.2d 688, 692-93, 16 U.S.P.Q.2d 1987, 1901 (Fed. Cir. 1990). As discussed in the specification and demonstrated in the Examples, the claimed alloys possess unexpectedly

improved elastic properties after cold working. Example 1 discloses that “[t]he alloys shown in Table I also exhibit linear superelasticity after cold working.” (see paragraph [0052])

Applicants respectfully submit that the data show that the presently claimed composition possesses properties that the compositions of JP ‘241 and Sagoi do not have. Accordingly, the unexpectedly improved elastic properties of the presently claimed composition would successfully rebut a *prima facie* case of obviousness, if it existed.

Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejections Over U.S. Patent No. 6,258,182 to Schetky et al.

Claims 1-25 stand rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over U.S. Patent No. 6,258,182 to Schetky et al. (“Schetky”). Applicants gratefully acknowledge the Examiner’s withdrawal of the § 102(b) rejection over Schetky. (Office Action dated March 6, 2006 at page 8, ¶ 12) Applicants respectfully traverse the instant § 103 rejection.

The Examiner has stated that the alloys of claims 1, 16, and 21 fall within the scope of the limits of Mo, Al, Cr, V, and Nb listed in Table III of Schetky, wherein the examples encompass: 8.4-12% Mo, 2.3-3.7% Al, 0-1.8% Cr, 0-1.8% V, 0-3.8% Nb. (Office Action dated March 6, 2006 at page 4) The Examiner has stated that “[o]verlapping ranges have been held to be a *prima facie* case of obviousness.” (Office Action dated March 6, 2006 at page 4) The Examiner has stated that Schetky also teaches the process limitations of Claims 2, 12, 17, and 22. Concerning Claims 3-10, 13, 14, 18-20, 23, and 24, the Examiner has stated that “where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established.” The Examiner has further stated that the “*prima facie* case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product.” (Office Action dated March 6, 2006 at page 5)

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the

proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

Applicants respectfully submit that there is no motivation for one of ordinary skill in the art to modify Schetky to arrive at the claimed invention. In the first instance, Schetky teaches away from compositions having a molybdenum content of less than 10 wt% because those compositions exhibit inferior elastic properties. Table III discloses alloys #27 and #36 comprising 9.5 wt% and 8.4 wt% Mo, respectively, but these alloys failed to display either pseudo-elastic strain recovery or shape memory strain recovery. Alloy #28, comprising 10 wt% Mo, also failed to display any shape memory effect. On the other hand, alloy # 42, comprising 10.2 wt% Mo, “exhibited the highest pseudo-elastic strain recovery.” (Col. 7, lines 13-14) One of ordinary skill in the art would recognize that the trend indicated that compositions comprising less than 10 wt% Mo may exhibit progressively decreasing elastic properties. A person of ordinary skill in the art upon reading this disclosure and discovering that compositions having less than 10.0 wt% molybdenum fail to exhibit significant pseudo-elastic strain recovery, would not be motivated to modify Schetky to reduce the amount of molybdenum.

Upon testing alloy # 42, which had the highest pseudo-elastic strain recovery, Schetky further discloses that

It can be seen that pseudo-elastic strain recovery decreases only slightly as a result of increasing amount of cold work, indicating that pseudo-elasticity in this alloy is not significantly affected by cold deformation up to 20%.

(Col. 8, lines 46-51; Fig. 6). Upon reading Schetky, one of ordinary skill in the art would understand that the alloy with the highest pseudo-elastic strain recovery displayed a slight decrease in pseudo-elastic strain recovery when cold worked. Because Schetky teaches that cold working causes a slight decrease in pseudo-elasticity from the highest pseudo-elastic strain recovery, one of ordinary skill in the art would not be motivated to cold work an alloy to increase the elastic properties of the alloy.

Applicants respectfully submit there is no motivation to combine an alloy composition comprising less than 10 wt% Mo, which Schetky teaches has decreased elastic properties, with cold working the alloy, which Schetky teaches results in decreased elastic properties, to provide

an alloy with improved elastic properties. In addition, there is no reasonable expectation of success that the combination of two elements that each result in decreased elastic properties will provide improved elastic properties. Because there is no motivation to modify Schetky and no reasonable expectation that the modification will be success, Applicants believe that the Examiner has not made a *prima facie* case of obviousness over Schetky. Applicants respectfully request a withdrawal of the § 103 (a) rejection and an allowance of the claims.

Even if a *prima facie* case of obviousness were conceded, which it is not, it is respectfully submitted that applicant's invention is not obvious because the particular combination of claimed elements results in unexpectedly beneficial properties. One of ordinary skill in the art would expect that the combination of two elements, which are each expressly disclosed to result in decreased elastic properties, would similarly result in decreased elastic properties. As described above, the present alloys possess unexpectedly improved elastic properties after cold working. (see paragraphs [0041] and [0052]-[0056]) Accordingly, the unexpectedly improved elastic properties of the presently claimed composition would successfully rebut a *prima facie* case of obviousness, if it existed.

Reconsideration and withdrawal of this rejection are respectfully requested.

Nonstatutory Double Patenting Rejections

Claims 1-25 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-52 of copending Application No. 10/609,004, Claims 1-49 of copending Application No. 10/755,034, Claims 15-24 of copending Application No. 10/869,359, and Claims of copending Application No. 10/755,085.

Applicants thank the Examiner for pointing out the potential obviousness-type double patenting issue between the claims of the present application and those of co-pending Application No. 10/609,004, Application No. 10/755,034, Application No. 10/869,359, and Application No. 10/755,085. In view of the possibility that claims in the cited application or the present application will be further amended before allowance, Applicants will defer responding to this provisional rejection until claims in the reference application are allowed, claims in the

present application are otherwise allowable, and it is determined whether this provisional rejection becomes an actual rejection.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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